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ON LINE DATABASES: WPI and CLAIMS

## (54) Water heating devices

(57) A cordless device e.g. a kettle or jug has a water holding section (12) with an immersion heater (16) and a base (11) connected to a power supply, the upper section (12) being detachable from the base (11), when desired, but when the upper section (12) is operably connected to the base (11), the power connection means (17) supplies electric power to said immersion heater (16). A thermally responsive switch (30) is located in the base (11) and a steam path (22) delivers steam from a region of the upper section (12) to a position adjacent the switch (30) upon boiling in the section (12), the switch (30) being located to interrupt power supply to heater (16) on boiling. Further claimed is a device which allows power supply to an immersion heater via first and second electrical contact members at least one of which is moveable thermally responsive electrically conductive member which is adjacent to a steam flow path.

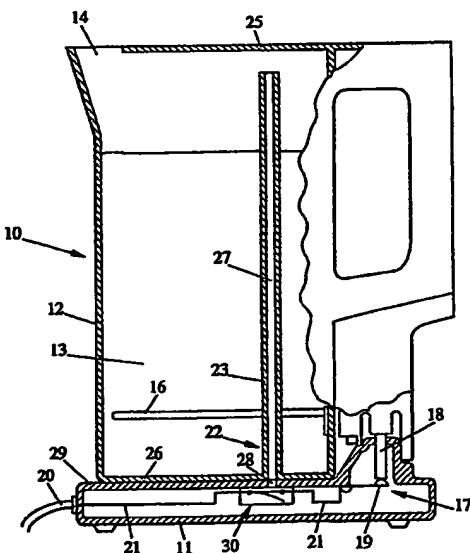


Fig 1a.

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Fig 1a.

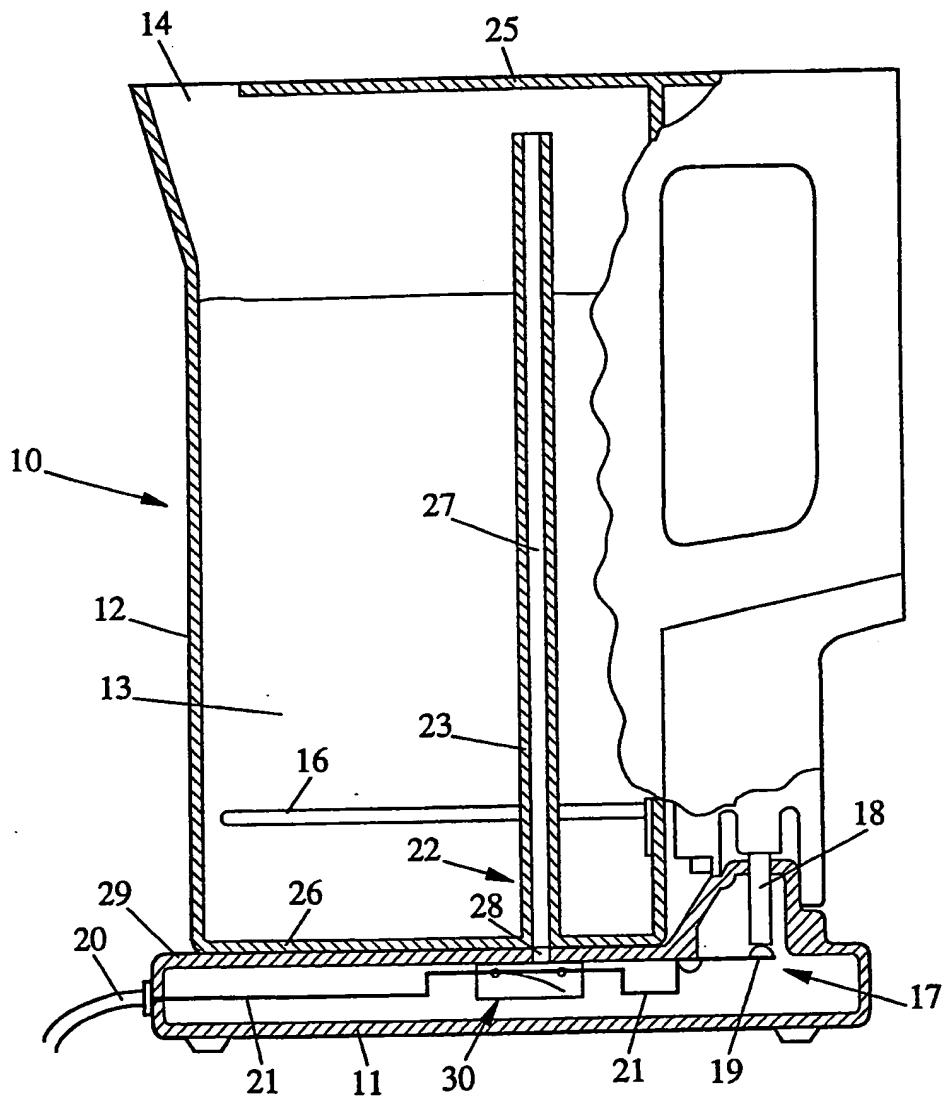


Fig 1b.

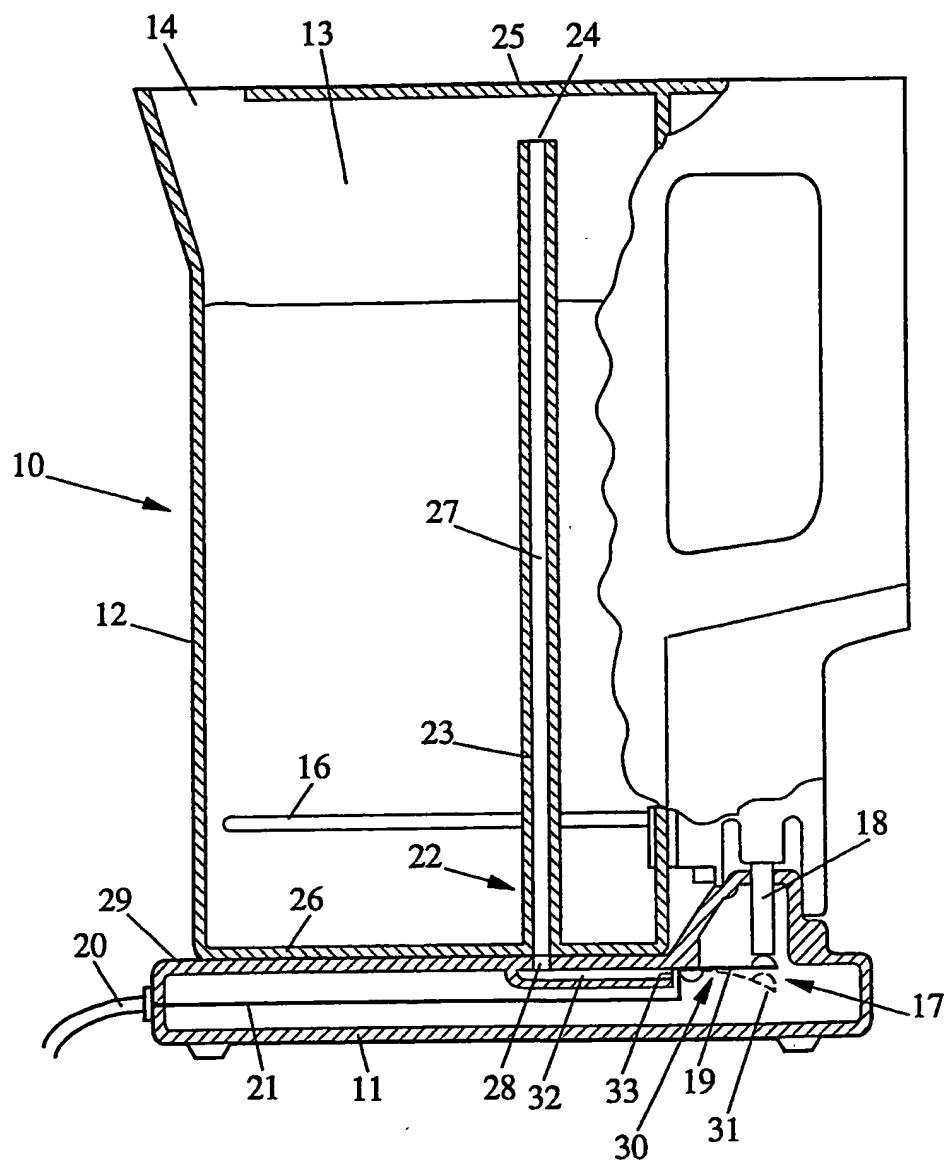


Fig 2.

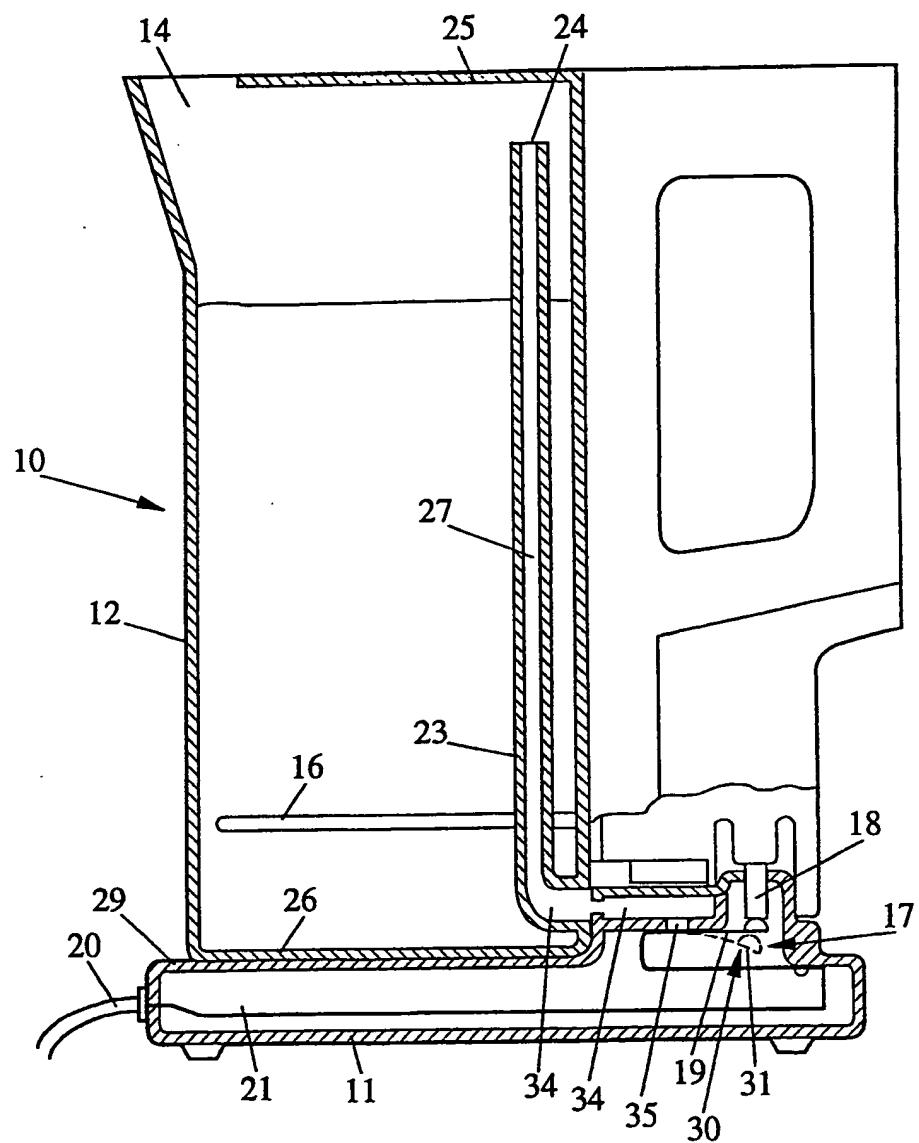


Fig 3.

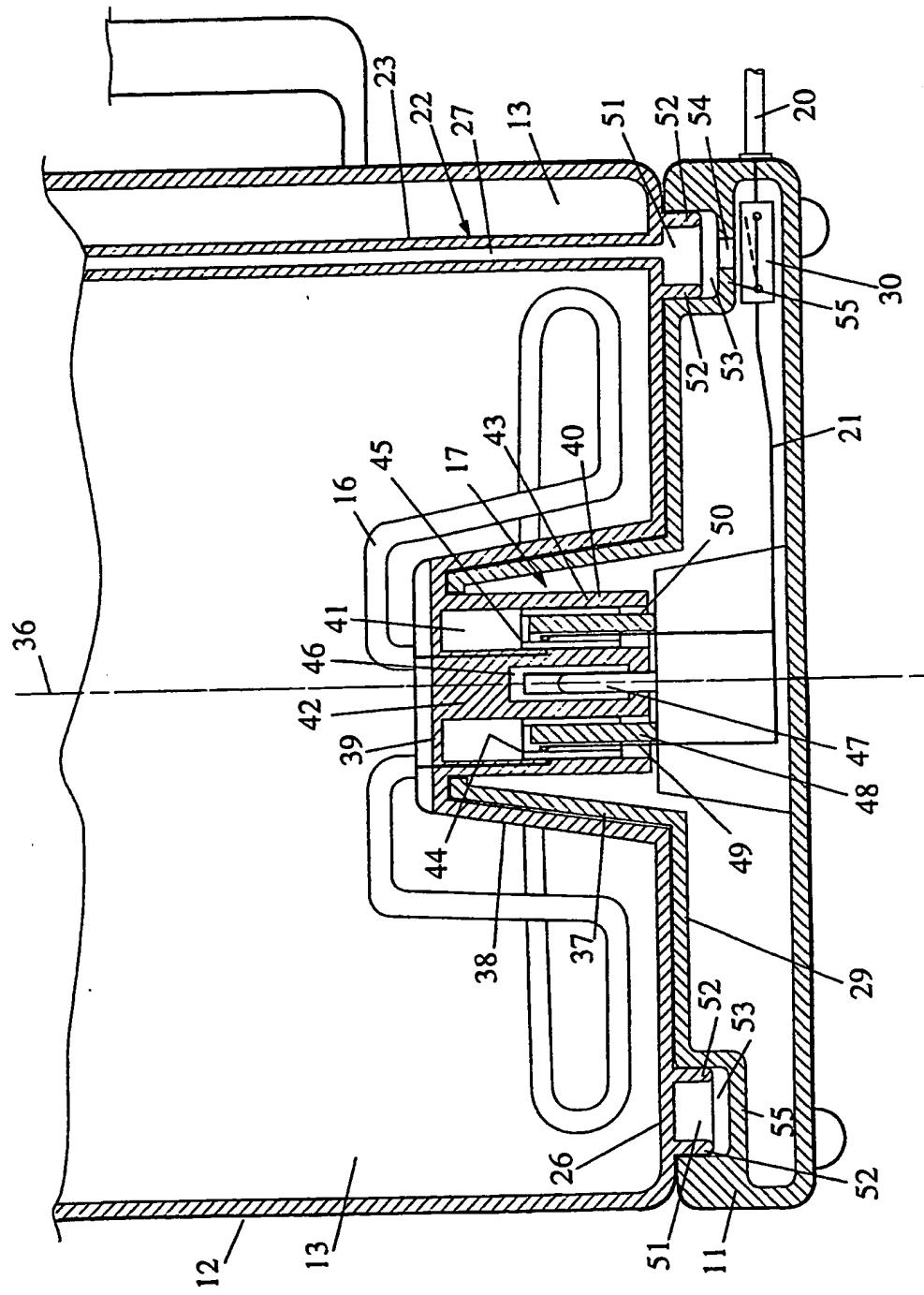
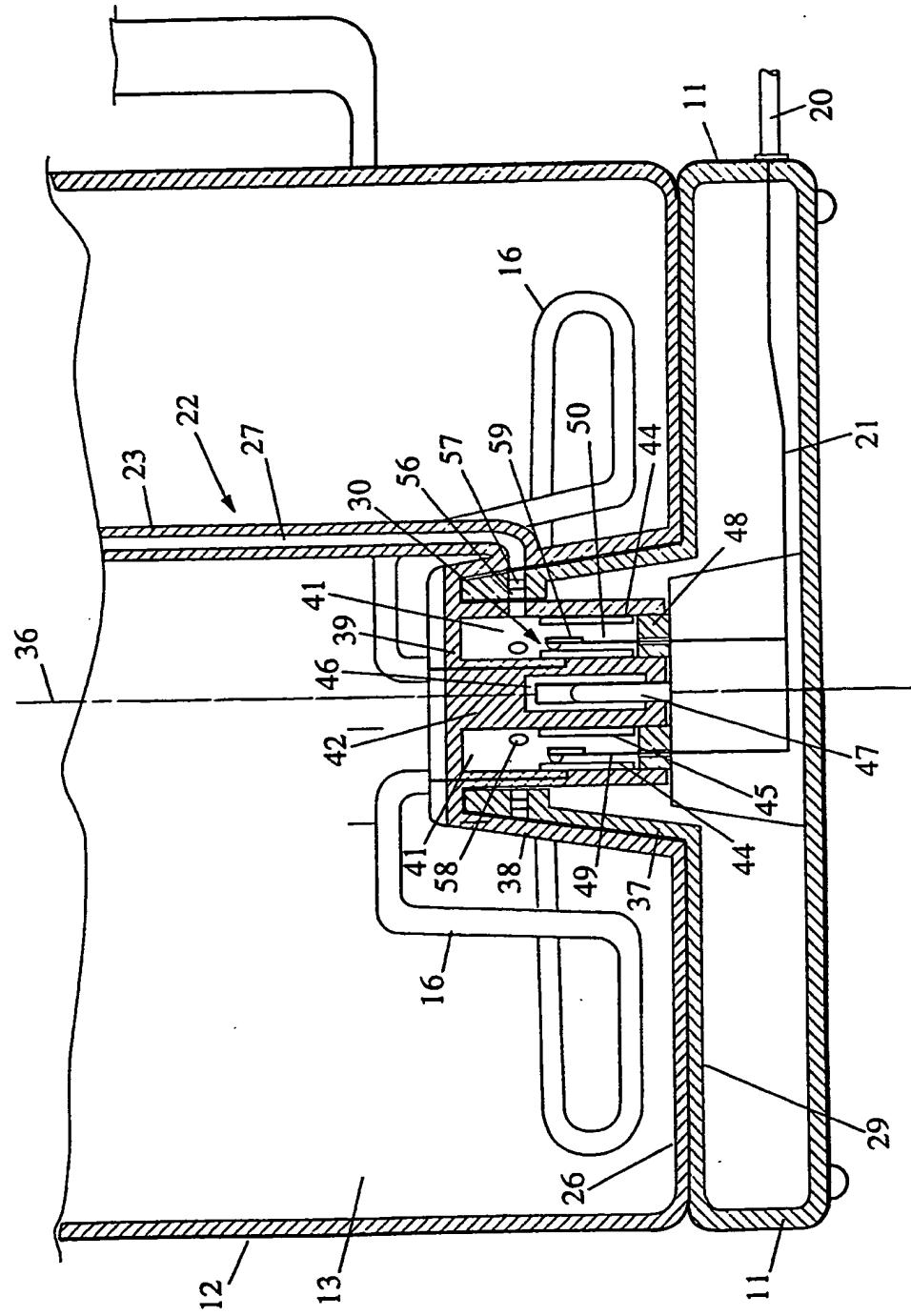


Fig 4.



**Improvements In Cordless Water Immersion Heating Implements**

The present invention relates to improvements in 5 cordless water immersion heating implements such as kettles and jugs.

Cordless kettles and jugs are becoming ever increasingly popular, however, the design of such implements 10 particularly when an auto turn-off facility is required upon boiling of water is difficult and creates manufacturing problems with increased costs. It is conventional in this art for jug or kettle manufacturers to build the implement around an available control or control in combination with 15 an immersion heating element which is supplied to them by a specialist supplier of such controls. Thus, the control is either a single unit combined in a particular arrangement or it is a number of separate elements which need to be separately installed in the kettle or jug. These 20 conventional arrangements have a number of perceived problems which include:

- i) that the thermally sensitive switch such as a bi-metal or similar device provided to disconnect power on a 25 boil condition is either located in the top of the kettle or jug requiring wiring to be supplied from the base region of the kettle or jug where the remainder of the controls are located, or it is located with the other controls in the base region requiring a 30 relatively complicated external steam delivery path to the switch;
- ii) that the power interconnect system between the power supply base and the cordless kettle or jug is normally specific such that the kettle or jug can be connected 35 to the base in only one particular orientation;

iii) that the controls together with at least part of the power interconnection between the base and the jug or kettle are commonly largely carried by the jug or kettle thereby requiring the use of a bulky and

5 unsightly housing section to hold same usually located beneath the handle. This control housing section, in many designs also takes up at least part of the possible water holding volume within the kettle or jug; and

10 iv) that the thermally responsive switch (such as a bi-metal) and commonly many other parts of the control are produced as separate elements and placed in an assembly (or partial assembly) in simple juxtaposition with other control elements rather than truly

15 integrating the various parts to limit the complication, cost and size of the control assembly as a whole.

We will hereinafter refer to "kettles" but it will be  
20 understood that this term will include jugs and any other similar water immersion heating implement.

The objectives of the present invention are to provide improved arrangements in kettles (particularly so-called  
25 cordless kettles) which will overcome or minimise at least some of the aforementioned problems associated with conventionally known devices.

According to a first aspect of the present invention,  
30 there is provided an electrically operated water immersion heating device comprising a base section adapted to be connected to a power source, an upper section defining a water retaining vessel having an immersion heating means located therein, and power connection means between said  
35 upper section and said base section allowing said upper

section to be detached, when desired, from said base section, said power connection means enabling electric power to be supplied to said heating means when said upper section is operably connected to said base section, said device 5 being characterised by the provision of a steam flow path communicating with an upper region of said upper section of the device and extending to a position within said base section and a thermally responsive switch means arranged in said base section to discontinue the supply of power to said 10 heating means upon steam passing down said steam flow path when a boil condition occurs in said water retaining vessel.

Conveniently, said power connection means is such as to permit said upper section to be operably connected to said 15 base section in more than one relative rotational position. Preferably, said upper section is operably connectable to said base section in any relative rotational position about an axis of rotation. Conveniently, said steam flow path includes an annular or part annular trap section located 20 between said upper and base sections of the device. The annular (or part annular) trap section may be located in the bottom of said upper section or the top of said base section or partially in both said upper and base sections. Conveniently, opening means or passage means leads from said 25 annular (or part annular) trap section to a position at least adjacent the thermally responsive switch means.

In a further aspect, the present invention provides an electrically operated water immersion heating device, said 30 device including power supply means comprising at least a first electrical contact member moveable into electrical engagement with a second electrical contact member to allow power to be supplied therethrough to an electrical resistance immersion heating means, at least one of said 35 first and second contact members being formed by a thermally

responsive electrically conductive member which is capable of movement between a first position establishing an electrically conductive path between said first and second contact members and a second position breaking said 5 electrically conductive path between said first and second contact members upon said thermally responsive electrically conductive member sensing a predetermined temperature, and a steam flow path leading from an upper region of said device to a position at least adjacent to said thermally responsive 10 electrically conductive member so as to move said member to said second position upon steam flowing along said flow path. Preferably, manually operable reset means is provided to move said thermally responsive electrically conductive member to said first position as desired. The aforesaid 15 arrangement may be provided in a power supply arrangement for a conventional kettle or may be arranged in the power connection between a base section and an upper section of a cordless kettle. The arrangement may of course be provided in any of the previously described immersion heating devices 20 according to the present invention.

Several preferred embodiments will now be described with reference to the accompanying drawings although it will be apparent to those skilled in the art that other 25 arrangements will fall within the scope of this invention.

In the drawings:

Figures 1a and 1b are schematic cross-sectional views of first and second preferred embodiments of a kettle 30 according to one aspect of the present invention;

Figure 2 is a view similar to Figures 1a and 1b but showing a third preferred embodiment;

Figure 3 is a cross-sectional view of the lower section of a cordless kettle according to a further preferred 35 embodiment; and

Figure 4 is a view similar to Figure 3 showing a still further preferred embodiment.

Figure 1 of the drawings shows schematically a first 5 embodiment of a cordless kettle 10 having a base section 11 and an upper section 12 defining a water receiving vessel having a water retaining compartment 13. An upper opening 14 permits discharge or introduction of water from or to the compartment 13. An electric resistance heating element 16 10 of any conventional design is provided in a lower region of the compartment 13 and connection of power to the element 16 is achieved by an appropriate power connection means 17 acting between the vessel 12 and the base section 11. The power connection means comprises appropriate first contacts 15 18 (one of which is illustrated) carried by the vessel 12 which electrically engage with second contacts 19 (again one of which is illustrated) located in the base section 11. The contacts are electrically engaged when the vessel 12 is engaged on the base 11 in the position illustrated. Power 20 is supplied from an external source through a normal supply cord 20 and via an electrical connection 21 to the contacts 19. A steam delivery path 22 is provided via a riser tube 23 internally of the vessel leading from an upper end 24 adjacent but below a top wall 25 of the vessel through the 25 base wall 26 of the vessel 12. In an alternative embodiment, the steam delivery path may be located externally of the vessel 12. The passage 27 defined by the riser tube 23 opens at its lower end over an opening 28 in the top wall 29 of the base section 11. The opening 28 is 30 located directly adjacent a thermally responsive switch means 30 which may be a bi-metallic switch or any other similar device. This switch means 30 is adapted to break the electrical connection to at least one of the second contacts 19 when steam passes down the passage 27 upon water 35 boiling in the vessel 12. Appropriate reset means (not

shown) would be provided in this and other embodiments described hereinafter to reset the switch means 30 to reactivate the kettle when and if desired. The reset means may be of any conventional type and further may be 5 automatically operated or may be of the type requiring manual intervention. Figure 1b represents a still further embodiment where the switch means 30 is formed by at least one of the active second contacts 19 being itself formed as an electrically conductive thermally responsive member 10 capable of moving to the position 31 shown in dotted outline upon sensing a predetermined temperature level. This predetermined temperature level is achieved by providing a further passage 32 in the base section 11 leading from the opening 28 to a discharge end 33 adjacent to the contact 19. 15 It will of course be appreciated that the positioning of the steam flow passages and other illustrated integers may be varied to suit manufacturing techniques as may be desired. Figure 2 illustrates a still further embodiment somewhat similar to Figure 1b except in this case the steam flow 20 passage 27 opens through a side wall of the vessel 12 into a passage 34 leading to a discharge opening 35 which again is located adjacent a thermally responsive member forming a second contact 19.

25 Figures 3 and 4 illustrate still further preferred embodiments wherein the vessel 12 can be connected to the base section 11 in any angular configuration about a central axis 36. In this case, the power connection means 17 between the base section 11 and the vessel 12 permits 30 relative rotation between the two parts while still maintaining the power connection. The base section 11 includes a central annular wall 37 projecting upwardly from the base section top wall 29 adapted to project into a space defined by an annular wall 38 projecting inwardly from the 35 bottom wall 26 of the vessel 12. A wall 39 spans the top of

the annular wall 38 and a boss 40 projects downwardly from this wall. The boss 40 has an internal annular space 41 which divides the boss 40 into a central pin 42 and an outer annular wall 43. A first annular contact ring 44 is fixed 5 to an inner surface of the outer annular wall 43 and a second annular contact ring 45 is fixed to an outer surface of the central pin 42. Within the central pin 42, a third contact 46 is formed adapted to receive an upwardly projecting contact pin 47 located within the base section 10 11. An annular wall 48 is also carried within the base section 11 located around the contact pin 47. Contact strips 49, 50 are also provided, one outwardly of the wall 48 and one inwardly of the wall 48 so as to respectively electrically engage the contact rings 44, 46 when connected 15 as shown in Figure 3. The arrangement is such as to allow the vessel 12 and the base section 11 to be connected in any angular position and be rotated relative to one another. A steam path 22 is formed by a tube 23 forming a passage 27 leading from an upper region in the vessel 12 through its 20 base wall 26 into a steam trap 51 located between a pair of annular downwardly depending walls 52. The walls 52 are adapted to fit within an annular upwardly open space 53 formed within the base section 11. One opening 54 leads through a base wall 55 of the space 53 and is adapted to 25 direct steam into a thermally responsive switch means 30 (of any desired type) which will break the power connection from lead 20 to the connection means 17. Thus, power is disconnected from the heating element 16 when water boils within the vessel 12. Any suitable reset means (not shown) 30 would be provided to reset the switch means 30 to recommence kettle operation when desired. Figure 4 illustrates schematically a modification of the embodiment of Figure 3. In this case at least one of the contact strips 49, 50 is formed as a thermally responsive member (bi-metallic or the 35 like) to form the switch means 30 and the steam path 22

leads directly into the space 41 to be directed onto the contact strips 49, 50 when water boils within the kettle. The arrangement disclosed uses inner and outer annular manifolds 56, 57 in the wall 37 connected by a number of 5 flow openings. The inner manifold 56 communicates with one or more openings 58 in the wall 40. If necessary, an insulation strip 59 may be carried on each of the contact strips 49, 50. Again a suitable reset mechanism (not illustrated) would be used to reactivate the kettle when 10 desired.

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## CLAIMS

1 An electrically operated water immersion heating device comprising a base section adapted to be connected to a power source, an upper section defining a water retaining vessel having an immersion heating means located therein and power connection means between said upper section and said base section allowing said upper section to be detached, when desired, from said base section, said power connection means 10 enabling electric power to be supplied to said immersion heating means when said upper section is operably connected to said base section, said device being characterised by the provision of a steam flow path communicating with an upper region of said upper section of the device and extending to 15 a position within said base section and a thermally responsive switch means arranged in said base section to discontinue supply of power to said immersion heating means upon steam passing down said steam flow path when a boil condition occurs in said water retaining vessel.

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2 A device according to Claim 1, whereby said steam flow path comprises a first passage means formed in said upper section and a second passage means formed in said base section, said first and second passage means having 25 communicating end regions when said upper section is operatively connected to said base section.

3 A device according to Claim 1 or Claim 2, whereby said thermally responsive switch means forms at least part of the 30 power connection means enabling electric power to be supplied to said immersion heating means.

4 A device according to any one of Claims 1 to 3, whereby said power connection means permits said upper section to be

operably connected to said base section in more than one relative position.

5 A device according to any one of Claims 1 to 3, whereby 5 said power connection means permits said upper section to be operatively connected to said base section in any relative rotational position about an axis of rotation.

6 A device according to Claim 4 or Claim 5, whereby said 10 steam flow path includes an annular or part annular trap means located between said upper section and said base section.

7 A device according to Claim 6, whereby said trap means 15 is at least partly located in a base wall part of said upper section.

8 A device according to Claim 6, whereby said trap means is at least partly located in an upper wall part of said 20 base section.

9 A device according to Claim 1, whereby said power connection means permits said upper section to be operatively connected to said base section in any relative 25 rotational position about an axis of rotation, said steam flow path including an annular or part annular trap means located between said upper section and said base section, said steam flow path further having at least one first passage means formed in said upper section with an end or 30 ends opening into said trap means and said steam flow path still further having a second passage means leading from said trap means to a position at least adjacent the thermally responsive switch means.

10 A device according to Claim 9, whereby said thermally responsive switch means forms at least part of the power connection means enabling electric power to be supplied to said immersion heating means.

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11 An electrically operated water immersion heating device, said device including power supply means comprising at least a first electrical contact member moveable into electrical engagement with a second electrical contact member to allow power to be supplied therethrough to an electrical resistance immersion heating means, at least one of said first and second contact members being formed by a thermally responsive electrically conductive member which is capable of movement between a first position establishing an 10 electrically conductive path between said first and second contact members and a second position breaking said electrically conductive path between said first and second contact members upon said thermally responsive electrically conductive member sensing a predetermined temperature, and a 15 steam flow path leading from an upper region of said device to a position at least adjacent to said thermally responsive electrically conductive member so as to move said member to said second position upon steam flowing along said flow path.

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12 A device according to Claim 11, whereby reset means move said thermally responsive electrically conductive member to said first position.

30 13 A device according to Claim 11 or Claim 12, further comprising a base section including said power supply means, an upper section defining a water retaining vessel having said immersion heating means located therein, power connection means located between said upper section and said 35 base section allowing said upper section to be detached,

when desired, from said base section, said power connection means enabling power to be supplied to said immersion heating means when said upper section is operably connected to said base section, and said device whereby said steam flow path passes into said base section from said upper section.

14 A device according to Claim 13, whereby said power connection means permits said upper section to be 10 operatively connected to said base section in more than one relative position.

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Patents Act 1977  
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 (The Search report) 13

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Relevant Technical Fields

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(ii) Int Cl (Ed.6) A47J 27/21

Search Examiner  
 M R WENDT

Date of completion of Search  
 25 JANUARY 1995

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
 1-10

(ii) ON LINE DATA BASES: WPI AND CLAIMS

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2222025 A	(STRIX) see Claim 11 figures	1, 2
A	US 4982654	(SEB) see Claim 1 and Figure 1 Abstract	1

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).